

# **U. S. Railroad Retirement Board**



## **Web Services Architecture**

# Web Services Architecture

## Table of Contents

<b>WEB SERVICES DOMAIN DEFINITION.....</b>	<b>4</b>
<b>DOMAIN TECHNOLOGY CATEGORIES .....</b>	<b>4</b>
<b>WEB SERVICES DOMAIN PRINCIPLES SUMMARY .....</b>	<b>4</b>
<b>DOMAIN RELEVANT TRENDS.....</b>	<b>6</b>
<b>BACKGROUND OF WEB SERVICES AND RELATED TECHNOLOGIES AT THE RRB.....</b>	<b>7</b>
<b>DETAILED DOMAIN PRINCIPLES.....</b>	<b>8</b>
<b>DOMAIN PRINCIPLE 1 - PRODUCTS AND TECHNOLOGIES .....</b>	<b>8</b>
<i>The RRB will be a “fast follower” in the evaluation, purchase and use of application development products and technologies. ....</i>	<i>8</i>
<b>DOMAIN PRINCIPLE 2 - BUSINESS REQUIREMENTS .....</b>	<b>9</b>
<i>Establish and prioritize business needs/requirements before proceeding to application design and development. ....</i>	<i>9</i>
<b>DOMAIN PRINCIPLE 3 - EXTENSIBLE DEVELOPMENT &amp; ADAPTIVE SYSTEMS.....</b>	<b>9</b>
<i>Applications will be developed that enable adaptability to changes in business needs and technology.....</i>	<i>9</i>
<b>DOMAIN PRINCIPLE 4 – RAPID APPLICATION DEVELOPMENT .....</b>	<b>10</b>
<i>The RRB will favor application development methods and approaches that enable quicker delivery of required, essential functionality. ....</i>	<i>10</i>
<b>DOMAIN PRINCIPLE 5 - N-TIER DESIGN .....</b>	<b>10</b>
<i>Applications will be designed with a minimum of three distinct logical layers consisting of presentation, business rules and data access. ....</i>	<i>10</i>
<b>DOMAIN PRINCIPLE 6 - COMMON COMPONENTS.....</b>	<b>11</b>
<i>Applications will be developed by reusing existing components wherever practical. New components will be developed with reuse in mind.....</i>	<i>11</i>
<b>PRINCIPLE 7- VALIDATION PROCESS.....</b>	<b>12</b>
<i>Applications will be designed and developed to validate information as close to its source as possible. ....</i>	<i>12</i>
<b>PRINCIPLE 8 - QUALITY ASSURANCE .....</b>	<b>12</b>
<i>Objective feedback, such as IT metrics and survey results, on the quality of an application needs to be captured periodically and appropriately considered in assessing the ongoing success/acceptability of that application. ....</i>	<i>12</i>
<b>DOMAIN PRINCIPLE 9 – BUSINESS/IT VISION.....</b>	<b>13</b>
<i>Business and IT staff must have a common vision.....</i>	<i>13</i>
<b>DOMAIN PRINCIPLE 10 – BUSINESS PROCESSES.....</b>	<b>13</b>
<i>Business processes drive technical web architectures .....</i>	<i>13</i>

DOMAIN PRINCIPLE 11 – CENTRAL CONTROLS.....	13
<i>Centralize Web standards, protocols and/or content maintenance and control functions.....</i>	13
DOMAIN PRINCIPLE 12 – UNIFIED MODELING LANGUAGE .....	14
<i>Use Unified Modeling Language (UML) for design of object and component based applications.</i>	14
.....	14
<b>WEB SERVICES PREFERRED DOMAIN DESIGN PATTERNS.....</b>	<b>15</b>
PATTERN 1 .....	15
<i>Establish Web Management Roles.....</i>	15
PATTERN 2.....	23
<i>Establish and maintain desired desktop configuration for Web developers .....</i>	23
PATTERN 3.....	24
<i>Establish project teams for each Web Application.....</i>	24
PATTERN 4.....	26
<i>Use of the Unified Process for the Web Application Development Life Cycle.....</i>	26
<b>DOMAIN PARTICIPANTS .....</b>	<b>28</b>
<b>APPENDIX 1: DOMAIN GLOSSARY .....</b>	<b>28</b>
<b>APPENDIX 2: CONCEPTUAL TO DOMAIN PRINCIPLE MATRIX.....</b>	<b>29</b>

## ***Web Services Domain Definition***

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The Web Services domain describes the technologies, standards, and guidelines used in the support, development, enabling and management of web-based application for the agency's intranet and internet sites.

It also defines requirements and procedures to enable the RRB's web based initiatives to

- ***Support the business and program priorities of the RRB.*** Technology investments must be channeled in areas that will give measurable improvements in public service. In particular, the web architecture must enable the development of systems that facilitate the implementation of new business processes and the creation of innovative service delivery approaches.
- ***Enable new applications to be developed faster and modified quickly, as business needs and program requirements change.***
- ***Simplify the support of operations so that the RRB's technical infrastructure can be managed efficiently and reliably.*** The web architecture will prescribe appropriate standards for technology. As a result, old and new systems will work together, and the greater use of common components, which will be shared on an agencywide scale, will enable the infrastructure to be managed in a cost-effective manner.
- ***Enable the RRB to continue to capitalize on its existing investment in applications and technology, as appropriate, while enabling a different approach to implementing systems.*** New applications and enhancements to old systems will be built by the assembly of standard, modular and reusable components.

## ***Domain Technology Categories***

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- |  |  |
|--|--|
| ➤ Internet Management                  | ➤ Change Management Software (Repositories)            |
| ➤ Intranet Management                  | ➤ Project Management                                   |
| ➤ Mainframe Integration                | ➤ Document Management                                  |
| ➤ Web Application Development          | ➤ Imaging and Document Workflow                        |
| ➤ Languages                            | ➤ Process Modeling                                     |
| ➤ Software Testing and Debugging Tools | ➤ Web Development Tools                                |
| ➤ Report Writer Tools                  | ➤ COTS Products Integrated Into Developed Applications |
| ➤ Multimedia (for CBT)                 |  |
| ➤ Forms Software                       |  |
| ➤ Development Methodologies            |  |

## ***Web Services Domain Principles Summary***

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1. **Products and Technologies** The RRB will be a "fast follower" in the evaluation, purchase and use of application development products and technologies.
2. **Business Requirements** Establish and prioritize business needs/requirements before proceeding to application design and development.
3. **Extensible Development** Applications will be developed that enable adaptability to changes in business needs and technology.
4. **Rapid Application Development** The RRB will favor application development methods and approaches that enable quicker delivery of required, essential functionality.

5. N-Tier Design Applications will be designed with a minimum of three distinct logical layers consisting of presentation, business rules and data access.
6. Common Components Applications will be developed by reusing existing components wherever practical. New components will be developed with reuse in mind.
7. Validation Process Applications will be designed and developed to validate information as close to its source as possible.
8. Quality Assurance Objective feedback, such as IT metrics and survey results, on the quality of an application needs to be captured periodically and appropriately considered in assessing the ongoing success/acceptability of that application.
9. Business/IT Vision Business and IT staff must have a common vision. Adaptive web systems require program organizations and IT staff to share a common and cohesive vision of both the business and the role of technology in supporting the business. This requires IT staff to have a significant knowledge of the business
10. Business Processes Business processes drive technical web architectures
11. Central Controls Centralize Web standards, protocols and/or content maintenance and control functions.
12. Unified Modeling Language Use Unified Modeling Language (UML) for design of object and component based applications.

## ***Domain Relevant Trends***

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- Pressure for budget reductions limit funding availability for I/T investments.
- Legislative initiatives increase pressure for shorter payback periods for I/T investments.
- Customer expectations for hours and types of service delivery are set by the private sector (e.g., bank ATM machines, 24-hour access to stores, on-line ordering of products, etc.)
- The amount of time spent by a customer to access and receive services is a factor in improving customer satisfaction.
- Legislative changes and governmental initiatives involve shorter lead times for implementation. An example of this is the Government Paperwork Elimination Act.
- Cross-agency programs require the coupling of applications. For example, customers will not accept the excuse that an RRB application cannot be processed because outstanding SSA data.

## ***Background of Web Services and Related Technologies at the RRB***

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The RRB maintains a Website on the Internet ([www.rrb.gov](http://www.rrb.gov)) to provide our customers with a broad range of information about the agency and the services we perform. The RRB Website offers a great potential for on-line interactive transactions with our customers in the future, as the Internet becomes more widely available and measures are established to ensure the security of the information being processed.

The Government Paperwork Elimination Act (GPEA) of 1998 generally requires Federal agencies to provide for optional maintenance, submission, and disclosure of information through electronic means, where practicable, by October 2003. It also requires agencies to use electronic authentication (electronic signatures) to verify the identity of the sender and the integrity of the content. Federal guidelines concerning the use and acceptance of electronic signatures are to be established by the Office of Management and Budget by April 21, 2000. Another GPEA requirement is that employers (railroads and rail unions) store and file electronic information about their employees. The RRB is monitoring the Federal government's direction on establishing standards and guidelines, and will ensure that adequate measures are in place to protect the privacy of our individual customers, as well as the integrity of our mission-critical data, as we pursue added functionality through the Internet.

In response to GPEA, the RRB has established an Internet Services Plan. Under this plan, we will implement comprehensive Internet services to expand access to information and for our customers to conduct transactions with appropriate privacy and security safeguards. RRB Internet Services will provide our customers with the option to conduct their business with the RRB online. The RRB Internet Services will also provide for online access to their personal information.

The RRB also has a functional Intranet. Initially started as a pilot operation within the Office of Programs, the Intranet provides a common access method to many of the agency's documents, newsletters and forms. The Intranet has great potential for expansion. The target configuration will allow for a standard user interface to all application systems, as well as to documents, reports, forms, internal communications, and procedures.

As we continue to enhance our Internet and Intranet sites, a comprehensive Web Services Architecture is absolutely crucial. This document will be dynamic, in that it will continually evolve as we move further in our Internet and Intranet development. This architecture will provide consistency for our design and development efforts.

### **Domain Principle 1 - Products and Technologies**

**The RRB will be a “fast follower” in the evaluation, purchase and use of application development products and technologies.**

Rationale:

- We want to be leading, not “bleeding”, edge with emerging technologies to avoid waste inherent in inadvertent “beta testing” of products that are presented as production versions.
- We want to avoid forcing agency-wide adoption of products that have not gained acceptance by the IT community at large and, thus, have uncertain life cycles and support.
- Timely adoption of new technologies better supports business needs.
- The rapid rate of change in information technology requires us to keep pace.
- We must meet the expectations of the RRB public and external entities (railroads, other agencies).
- Allows RRB to be proactive rather than reactive to new technologies.
- May make RRB a more attractive employer and aid in retention of existing IT staff since their skills sets will be more up-to-date.
- An information technology environment that transcends current agency organizational boundaries can enable streamlined business processes, and reengineered government services.

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Implications:

- Requires an environment to evaluate the new tools and how they work within the RRB infrastructure that may impact the Platform domain (storage, set-up, interconnections...).
- Technologies may be less reliable in earlier releases.
- Responsibilities for monitoring products in current use at the RRB must be assigned.
- Responsibilities for monitoring and recommending emerging application development technologies must be assigned.
- Funding will influence the degree to which the RRB can execute this principle.
- To truly enable improvements in government services, the RRB's new "Infrastructure" must support the transmission, processing, and storage of data, text, voice, video, and images necessary to sustain the creative transformation of government services.

## **Domain Principle 2 - Business Requirements**

**Establish and prioritize business needs/requirements before proceeding to application design and development.**

Rationale

- By avoiding design issues in requirements, business needs have greater clarity.
- Developers are better able to decide the appropriate tools and technologies considering the enterprise wide technical architecture.
- Better chance of meeting user needs, especially the most important requirements if we establish mandatory vs. desirable requirements.
- The user will realize benefits more quickly because developers will be able to be more efficient (less rework, waste of developer time).
- Makes component development and reuse more likely because we will be better able to identify applicable existing components with the same or similar functionality.

Implications

- RRB must revise service request procedures.
- Project teams will spend more time in requirements phase.
- RRB must train users in identifying requirements and establishing priorities.
- RRB must train developers in evaluating requirements and in considering the ability of existing components to meet the requirements.
- User and developer must communicate earlier and more frequently throughout development.
- High priority requirements must be included in the initial rollout with lower priorities designated for later phase(s).

## **Domain Principle 3 - Extensible Development & Adaptive Systems**

**Applications will be developed that enable adaptability to changes in business needs and technology.**

*This approach is called "adaptive systems." Adaptive systems are designed to be easily modified to facilitate changes in the business programs they support. The following principles are provided to guide the design and selection of web technology components that will support the development of adaptive systems across the RRB.*

Rationale

- The maintenance burden will be eased.
- Guides the design and selection of web technology components that support easy modifications to facilitate changes
- Leads to shorter development times for later changes.
- Encourages modular design and consequent reuse of components.
- Helps avoid any solutions that are not compatible with architectural direction.
- May extend viability of associated tools and products.

Implications

- Developers must keep up-to-date with technology development.
- Requires RRB modernize development skill sets in anticipation of business needs and new technologies, allowing developers to "experiment" with the new knowledge.
- Requires better communication of business and technology trends between users and IT staff
- The initial development of an application will take longer.
- May push RRB to choose an alternative product or technology rather than the "best of breed" to address a particular issue.

## **Domain Principle 4 – Rapid Application Development**

**The RRB will favor application development methods and approaches that enable quicker delivery of required, essential functionality.**

### Rationale

- Helps us focus on the most essential requirements first
- Provides a better chance of successfully producing a useful product sooner by implementing essential functionality first.
- Allows reassessment and modification of requirements without significantly impacting cost and schedule.
- Meets user expectations for speed of delivery thereby providing positive reinforcement to users and developers.

### Implications

- Might have to consider a different System Development Life Cycle (SDLC) model or apply our current SDLC differently.
- Requires closer cooperation between users and developers in requirements and design.
- Requires more diligence in documentation.
- Need to employ “self-documenting” tools.
- Requires strong project management practices due to the iterative approach.
- Requires training for users and developers.
- May produce modular/phased deliverables.

## **Domain Principle 5 - N-Tier Design**

**Applications will be designed with a minimum of three distinct logical layers consisting of presentation, business rules and data access.**

### Rationale

- Facilitates reuse by causing functionality/services to be defined more discreetly in components.
- Facilitates changes to one layer without impacting others or the addition of new functionality/service, including the addition of another layer/tier.
- Promotes greater consistency in applications design since unique logic will most likely be found in the business rules layer.
- Enables conversion to web (or other new/unknown) technology.
- Promotes greater consistency in applications design since unique logic will most likely be found in the business rules layer.
- Produces greater accuracy because functions/services will be centralized in the application and more easily analyzed and tested. Separation of data and business rules will more readily reveal errors and help to isolate them.
- Complies with industry best practices.

### Implications

- Might require us to develop new types of interfaces to legacy systems.
- There may be more than 3 layers (e.g. security, middleware, persistence layer, control).
- Requires a more structured approach to development and defining requirements.
- Boundaries between layers must be carefully defined.
- Using tiers will by nature have some impact on performance. We will need to consider this impact when designing and testing applications to ensure that functionality is not impaired.
- Developers and definers of business rules must be trained in separating the layers and new testing techniques. The accuracy of the layering must also be tested.
- Helps users focus on requirements before design.
- May lead to division of labor among developers along the layers/tiers.
- Eases application audit and encourages focus on quality.

- Eases maintenance.

### **Domain Principle 6 - Common Components**

**Applications will be developed by reusing existing components wherever practical. New components will be developed with reuse in mind.**

#### Rationale

- Reduces overall complexity of the RRB technology environment by promoting standardized systems interfaces and greater consistency of common functionality/services.
- Reduces cost of maintenance and rewrites by minimizing redundancy across various applications that require the same function/services or within an application that uses a function/service multiple times.
- Reduces subsequent development time due to reuse of components.
- Increases accuracy because all applications will deploy the same tested, proven functionality (components) instead of each application rewriting the functionality/service for their own use.
- Allows for faster response to business rule changes that impact multiple applications because changes will only be made in one place.
- Common components will be designed to allow change to the component without impacting existing users.

#### Implications

- At a minimum, “component” includes interfaces, modules and objects.
- Security implications must be considered
- Initial development of common components will be complex and time-consuming
- Must develop a commonly available repository to list all common components, their functions and how to access them
- Must develop and follow a consistent naming convention
- Must define and publish listings and methods of calling common components
- Must provide training in methods of building common components
- An error in shared modules has greater impact
- More coordination among stakeholders needed to develop and implement
- Existing use must be considered when changing common components
- Must establish authority to change common components and business rules

## **Principle 7- Validation Process**

**Applications will be designed and developed to validate information as close to its source as possible.**

Rationale

- Promotes greater data accuracy by revealing the error when the source data is fresh.
- Promotes faster data problem correction.
- Limits exception processing after the initial editing.
- Allows transaction processing to complete more quickly because the data has been cleansed as early in the process as feasible.
- Provides greater likelihood of successfully completing processing.
- Provides a high degree of confidence in reporting and analytical processing output.
- Data can be shared and integrated (appropriately) across the RRB.

Implications

- The steward of data is responsible and accountable for its integrity
- Central accessible repository of validation rules must be created
- Data owners, users and stewards must agree on what the edit/validation rules are and who is authorized to change them (refer to DATA/OBJECT DOMAIN)
- Data owners and stewards must define and document their data (refer to DATA/OBJECT DOMAIN)
- Common edit routines must be used to ensure data consistency and integrity
- Revalidation is mandatory when data has been transformed or received from an un-trusted source

## **Principle 8 - Quality Assurance**

**Objective feedback, such as IT metrics and survey results, on the quality of an application needs to be captured periodically and appropriately considered in assessing the ongoing success/acceptability of that application.**

Rationale

- Assures that we are producing quality products both from a usability/business effectiveness perspective as well as through the use of IT efficiency measures.
- Provides objective measurement of how well applications are designed, function and meet the EA principles.
- QA feedback can be used as a mentoring tool for systems development and user/owner/stewards in defining requirements and testing.
- Using the feedback throughout the development life cycle helps build better systems by helping identify previously unidentified requirements or clarifying priorities.
- Ongoing query and analysis of the feedback helps determine the need for upgrade and replacement of systems.
- Improves relations with users by providing a channel for feedback/venting.
- Ongoing quality assurance efforts can aid in measuring efficient use of agency resources.

Implications

- Feedback must be filtered and analyzed using a consistent process and set of criteria.
- Need to establish measurable success factors in cooperation with stakeholders.
- Feedback will help develop best practices and will enable benchmarking.
- Need metrics to measure quality.
- Need QA function, which may require an organizational change.
- Need tools to support the QA function.
- Responsibility for addressing QA findings/recommendations needs to be assigned.

- Multiple sources of feedback will be considered (e.g. operations, users, developers, metrics).

### **Domain Principle 9 – Business/IT Vision**

#### **Business and IT staff must have a common vision**

*Adaptive web systems require program organizations and IT staff to share a common and cohesive vision of both the business and the role of technology in supporting the business. This requires IT staff to have a significant knowledge of the business.*

#### Rationale:

- Increased IT understanding of the business, will lead IT to design applications and adopt technical solutions to lessen the constraints of technology on subsequent modifications and expansions.
- Business units that have an understanding of the web technical architecture can better design business processes to take advantage of the support and benefits technology can provide.

#### Implications:

- IT staff must keep abreast of RRB laws, policies, and procedures.
- Programs staff must be educated in web technologies to allow for envisioning technical possibilities.

### **Domain Principle 10 – Business Processes**

#### **Business processes drive technical web architectures**

#### Rationale:

- Business processes drive the web application architecture.
- The requirements of the web application architecture drive the technical infrastructure.
- Adaptive web systems are *process-driven* architectures.
- The encapsulation and management of *process knowledge* across the enterprise is critical.

#### Implications:

- Requires strong coordination with Infrastructure Services.
- Requires strong coordination with Application Design (Mainframe).

### **Domain Principle 11 – Central Controls**

#### **Centralize Web standards, protocols and/or content maintenance and control functions.**

#### Rationale:

- Value in sharing ideas, issues, applications and solutions.
- Efficient way of coordinating activities, organize information and impart and monitor policies and standards.

#### Implications:

- Need to establish a Web Council responsible for setting policies, standards, and high-level style guides. The Web Council would also be responsible for monitoring the Enterprise Map for currency and adherence to standards.
- Need to establish an Editorial Board for creating and managing formal content to be both effective and to meet the enterprise and organizational standards.
- Need to establish a Web Technical Committee to define the technical standards and share information on innovative approaches and tools that make the Authors, Editors, and publishers more effective at creating and maintaining their own information.

## **Domain Principle 12 – Unified Modeling Language**

**Use Unified Modeling Language (UML) for design of object and component based applications.**

Rationale:

- Enhances/provides a common language with which to communicate and build understanding.
- Assists agency to visualize, specify, create, and document the artifacts of a software system.

Implications:

- Requires user and developer education and training.

### Pattern 1

#### Establish Web Management Roles

##### **Purpose**

As the RRB Internet and Intranet sites continue to grow, management of Web content is becoming increasingly complex and time-consuming. The following section defines appropriate roles and organizations for managing RRB Web content. The RRB will need to adopt these or similar roles and organizations in order to effectively manage our Internet and Intranet sites.

##### **Applicability**

Establish the appropriate roles and organization for managing RRB Web content.

##### **Structure Overview**

**Web Manager** **Description:** The Web Manager is responsible for coordinating and facilitating the overall functioning of the Intranet and Internet sites. The focus is primarily on the strategy, organization and quality of the Intranet and Internet sites as an effective communication environment. Where the Web Manager reports organizationally varies widely from one organization to another.

##### **Responsibilities:**

- Chairperson of the Web Council
- Develops and champions the overall web strategy within the agency
- Monitors, facilitates and coordinates the development of all web policies and standards
- Coordinates policy, standards and management interfaces with other organizations
- Develops and presents executive awareness and update programs
- Owns the Web standards documentation
- Owns the top level of the Enterprise Map

##### Discussion of Web Manager Roles and Functions

The Web Manager is responsible for facilitating cooperative opportunities among the various organizations in the enterprise and administering the enterprise content management infrastructure. This is not a technical role although some understanding of the technology is required. The Web Manager is primarily a manager and facilitator. By contrast, the Web Administrator is responsible for the technical infrastructure and tactical operation.

##### **Web Administrator**

**Description:** The Web Administrator is responsible for maintaining the Intranet and Internet technical infrastructure and provides the bridge between the technology and its use by non-technical specialists. The focus is on enabling the functional specialists and their communities of interest to communicate and innovate on the Web with as little direct dependence on technology specialists as possible. The role has two major aspects: technical architecture and administration, and support and user services. An agency may have multiple Web Administrators filling these roles for one or

more web servers. The "Grand-Web Administrator" coordinates the overall technical standards and may chair a Web Technical Council consisting of the other Web Administrators.

### **Responsibilities:**

#### **Technical**

- Administers and maintains one or more web servers and their software
- Provides backup and archiving of web server content
- Administers and ensures that access control and security requirements are met
- Acquires and installs shared applications, tools and libraries that enable functional specialists to create and maintain their own content and solutions
- Provides and maintains the Web search engines
- Provides interfaces to corporate databases and legacy applications
- Provides or arranges for custom Web application support to functional specialists

#### **Support**

- Reads and takes timely action on "Web Administrator" email
- Screens out "junk" mail
- Answers generic site mail
- Informs functional specialists of new Web enabling capabilities
- Provides or arranges for training on how to use the client-side tools

## **Publisher**

**Description:** The publisher is responsible for determining what information their organization regularly provides to others, both inside and outside the RRB. Each major organizational unit will have a publisher. When we view information as the primary driver of business functions, this role defines the interfaces to all other organizations and clearly is the responsibility of the functional head of the business unit. In practice today, a person who reports directly to the functional head of the organization fills this role.

### **Responsibilities:**

- Develops the content approval process for their organization
- Identifies and negotiates the information input requirements of their organization
- Identifies and negotiates the information output requirements of their organization
- Chairs their organization's Editorial Council
- Monitors, facilitates and coordinates the implementation of all Web policies and standards within their organization
- Owns their organization's standards for formal information
- Represents their organization on the Web Council

#### *Discussion of Publisher Roles and Functions*

Publishers determine what kinds of formal information will be created and maintained by their organization. Each major support area (Human Resources, Finance, Facilities, etc.) will have a publisher.

Generally, the people who perform these roles today are managers in the organization, but the publisher role today may be diffused across more than one person. The responsibilities of the publisher really belong to the

executive in charge of that organization, however the duties usually are delegated. This delegation is fine, but in the information age, the delegation should be explicit, and the person carrying it out should consult regularly with the executive.

The publishers represent their organization on the Enterprise Web Council and may create and chair an Editorial Board within their own organization. The publishers own the processes and policies that both the enterprise and their organization require officially sanctioned information to follow. This includes policies on completeness and timeliness of the information. In larger organizations, the publisher may delegate the monitoring and implementation of policy conformance to editors, but the responsibility remains with the Publisher.

Finally, the Publisher is responsible for keeping the portion of the Enterprise Map at their level and below current.

## **Editor**

**Description:** The editor performs the role of project manager for the creation and management of formal information related to a specific area or focus in their organization. Most large or complex organizations have several editors, one for each focus. The editor determines which specific information needs development or attention, identifies and obtains the authoring (or programmer) resources, manages the project through the development and review cycles and formally publishes the sanctioned information for which they are responsible. Note that information also can be software logic, product specifications, product designs or manufacturing processes. Therefore, the term "editor" as used here includes the project managers of these functions in addition to the traditional document-based meaning, if the output is published on the Intranet or Internet sites.

### **Responsibilities:**

- Identifies specific information required for a project
- Identifies and obtains the resources required to complete the project
- Develops and manages project schedules and timelines
- Ensures that information follows corporate and organizational policies and standards
- Identifies and manages the appropriate reviews and sign-offs
- Publishes the approved content on the proper servers
- Participates as a member of the Editorial Council
- Works with the Web Administrator to ensure proper availability, access controls, backup and archiving

### *Discussion of Editor Roles and Functions*

Editors are found in organizations that have multiple service areas. For example, Human Resources might have individual editors for Benefits, Compensation, Equal Opportunity and Staffing. The editor determines what official information will be created for specific activities and manages the information creation and update process, including the formal review cycles. Note that in a development organization, the editor class would include development and project managers.

## **Author**

**Description:** Authors create the basic content on the Internet and Intranet sites. The content may be textual or graphical logical. Generally, content is

created for a specific purpose. However, once available, content often is redirected toward other purposes. The Web can amplify the ability to reuse and redirect content. Web authors need to keep this in mind, and create content that both meets the proximate requirement and remains as modular and flexible as possible.

**Responsibilities:**

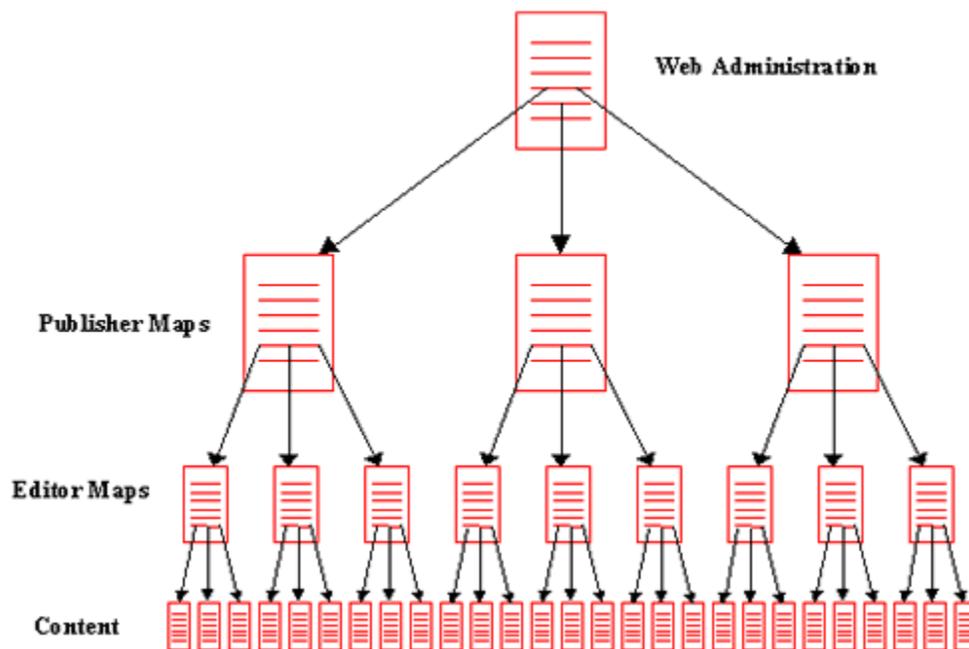
- Meet the information requirements of the immediate audience
- Adhere to creation, presentation and interface standards
- Design and organize content to be flexible and reusable

Discussion of Author Roles and Functions

Authors create the content. This role does not require more definition, because it tends to be well defined and independent of the communication medium. Once again, note that programmers and engineers also create content and as such are instances of the author class.

**Enterprise Map**

**Description:** The **Web Enterprise Map** (shown in the following figure) begins with a top page, owned by the Web Manager. This page consists of a link to the Map Page of each major organization in the RRB. The publisher for that organization owns this page. The Publisher Pages, in turn, consist of links to each of their Editor's Pages. The Editor's Pages may have additional pages or structure below them created and maintained by the editor that help organize the content, but ultimately these pages point to the actual content pages.



The Map provides a commitment (or accountability) view of all the formal content in our Web enterprise. Management can start at their point in the map and follow the links to all the content, which supports the functions for which they are responsible.

A Web Enterprise Map has several interesting characteristics. Once it is in place, authors and editors can self publish, and the information automatically shows up in a logical structure. Also, content categories and even editor level functions generally are not affected by reorganizations, because major service areas generally are neither added nor deleted. Most reorganizations shift responsibilities at higher levels in the Map. This means that when a reorganization does occur, the Map can be adjusted quickly, by the new managers, by changing one or a few links. Content does not need to be moved around. The result is a very low maintenance path to all the formal enterprise content, without forcing publishing through a central authority that can quickly become a bottleneck.

Because the Enterprise Map encompasses both the Intranet and Internet sites, the content portion of the map must indicate whether the content is Internet, Intranet, or both. This will help to control against redundancy, as well as being a checkpoint to target content to the proper medium and audience.

Five distinct roles have been identified to support the formal web content: the Web Administrator, the Web Manager, publishers, editors and authors. These roles can be new, or modifications to and clarifications of roles that already exist in our organization. Other roles will be determined by organizations as they evolve their own style, culture and uses. Note that these roles are content focused **and** address the issues of supporting the underlying technical infrastructure.

### **Web Council**

**Description:** The Web Council consists of the Publishers for all the organizations in the enterprise and is chaired by the Web Manager. Some enterprises have further qualified the name as the Web Policy Council to provide an organizational reminder that the council is not concerned with the technical aspects of the Web services. If the organizational executives have delegated the Publisher role to the right level people, slipping into a technical focus will not be a problem. If they have not, a warning should go up that the executives either do not understand the process or are not committed.

The Web Council is responsible for setting policies, standards and high-level style guides. While this can be very time consuming in the beginning, it quickly settles into a background maintenance function. The Web Council also is responsible for monitoring the Enterprise Map for currency and adherence to standards. This, too, tends to become a rather trivial background function.

The long-term value of the Web Council is the communication and coordination function, the sharing of ideas, issues, applications and solutions. If the members come to the meetings looking to share innovative ways to make their information more valuable or accessible, looking to identify functionality that could make their organization more effective at creating and maintaining their own information, then the Web Council will stay vital. If instead the primary focus of the Web Council becomes policy and map maintenance, then it quickly will become a poorly attended, unimportant meeting.

Two issues generally emerge in the Web Council. While the Web Council is not intended to be technical, they will uncover issues and opportunities that

require technical support. For this reason, it is a good idea to include the Web Grandmaster as a member of the Web Council. This provides the Web Grandmaster with first-hand knowledge of the issues and opportunities, and provides a link to the Web Technical Committee.

Second, if the organization has an external web page, the Web Council will likely take a keen interest in it sooner rather than later, even though the organizing charter was focused on the Web services. This is appropriate since it is very natural for the content on the external page to be created and managed via the Intranet. As the individual entities in the enterprise begin to understand the technology and accrue a rich set of material appropriate for external audiences, they become more interested in how their information is presented as part of the overall corporate image. Depending on the universality of interest, the external page issues can either become part of the Web Council agenda, or the Web Council can spawn a subcommittee for those interested.

The Web Council often goes by different names. It sometimes is called the Web Services Council, the Web' Steering Committee, the I-net Council, or other names. The function is to provide a forum for community discussion, coordination and decision making.

The following is a generic structure for a Web Council:

#### **Web Council Charter:**

To guide the development and evolution of Web technology as a tool to improve communication, business processes, and customer service within the enterprise by promoting effective business use and supporting community owned standards, diversity and enabling of the Web community and its individuals.

#### **Web Council Membership:**

Each major organization should have a member on the Council. This person will be considered the "Publisher" of information for that organization. Publisher in this context refers to the business and organizational authority, not the technical implementation. The member should have the ability to commit his organization to the development, maintenance and sharing of specific Web content and to negotiate information requirements from other organizations. Members need to understand the business processes and information flows of the organization they represent. They do not need to start with an understanding of Web technology, but must be committed to gaining an understanding of Web capabilities.

#### **Web Council Responsibilities:**

- Provide a forum for discussion of issues on effective Web use and usability
- Negotiate organizational and individual commitments for ownership of key Web content
- Share and promote useful ideas and skills among the Council and within the members' organizations
- Facilitate the development and brokering of Web policies and standards
- Collect and support requirements on current and future Web needs

**Editorial Board Description:** An Editorial Board is set up at the discretion of the Publisher, based on need. In small, specialized, organizations, the Publisher also may perform the implementation duties of the Editor making an Editorial Board irrelevant. In larger, more generalized, organizations, the management of the official information is delegated to multiple individuals. Forming an Editorial Board is an efficient way for the Publisher to coordinate activities, organize information and impart and monitor policies and standards.

Like the Web Council, the Editorial Board is not focused on technology. They are focused on creating and managing their formal content to be both effective and to meet the enterprise and organizational standards. For this reason, Editorial Board meetings tend to focus on lower level, pressing and immediate issues than the Web Council.

Also like the Web Council, the Editorial Board is responsible for the Enterprise Map at their level and below. However, their job is more complex because they are responsible for linking the Enterprise Map to the content. Often, this can be a less obvious and more creative process than mapping the management responsibility chains above their level. For this reason the Editorial Board gets more involved in issues of creating and updating the logical presentation of the content relationships.

**Web Technical Committee Description:** The Web Technical Committee is made up of the Web Managers and the Web Administrators in the Enterprise. The Lead or Senior Web Manager chairs this committee. Their focus is technical. Depending on the history and culture of the enterprise, the Web Technical Committee may define the technical standards, or may be a forum where the technical standards, created in another forum, are imparted to those who must implement them. The Web Technical Committee also provides an opportunity for the Web Managers to share information on innovative approaches and tools that make their Authors, Editors, and Publishers more effective at creating and maintaining their own information.

## Assumptions

Establishing Web management roles assumes the following:

- RRB management acknowledges and assigns these roles to appropriate staff.
- Staff filling these roles will follow the leadership of the Web Managers.

## Benefits

- Establishes roles and responsibilities for Internet and Intranet content management.
- Provides a method for controlling and coordinating RRB web content.

## Consequences

- Initial coordination may require significant time commitment.
- Managers must identify appropriate staff.

**Related Patterns**

None

**Known Uses**

Boardwalk administration.

## **Pattern 2**

### **Establish and maintain desired desktop configuration for Web developers**

#### **Purpose**

To establish a standard set of tools and configuration for web application development

#### **Applicability**

This pattern applies to developers creating web-based applications. Website administrator or web manager positions require different tools.

#### **Structure Overview**

- Windows 2000
- Microsoft Office Developer Edition
- Visual Studio Enterprise Edition (Note: Includes Visual Basic, Visual InterDev, Visual Modeler and Visual SourceSafe)
- Visual Studio.net
- SQL Server Enterprise Manager
- Microsoft FrontPage
- Macromedia Fireworks

#### **Assumptions**

- It will be necessary to maintain both Visual Studio version 6.0 and Visual Studio.net for an unknown time period.
- Coordinate with and Submit configuration to Infrastructure Services.
- Notify Infrastructure Services whenever requirements change.
- The latest versions of all software will be maintained.

#### **Benefits**

- Establishing a set of tools for web development limits the number of languages used in web applications.
- Reduces the amount of developer training required.
- Increases reusability of code and components.

#### **Consequences**

- Dependency on Microsoft technologies.
- Difficult to integrate Java programmed components.

#### **Related Patterns**

Unknown

#### **Known Uses**

E-Government Services Center

## **Pattern 3**

### **Establish project teams for each Web Application**

#### **Purpose**

Establish roles and responsibilities for various aspects of web application development.

#### **Applicability**

This pattern applies to all web application development projects.

#### **Structure Overview**

Web development teams should consist of the following roles:

- **Product Management** - The job of this role is to respond to the customer's need or problem. This is the advocate between the development team and the users. The Product Manager collects and refines user requirements, and is responsible for reaching agreement on phasing of product features.
- **Program Management** - The job of this role is to own and drive the development process. This is usually the Project Manager. The primary responsibility of the leader of the Program Management role is to move the project through the development process to ensure that the right product is delivered at the right time.
- **Development** - The job of this role is to be technology consultants and product builders. Development determines exactly how to implement each feature, the actual architectural implementation, and how long the coding portion of the project will take to implement. Development does not determine which features to implement, but how to write the code for the product. The goal of this role is delivery to product specifications.
- **Testing** - The job of this role is to determine what is right and what is wrong with the product, and clearly articulate it, so that the status of the product's development is accurately portrayed. Testing develops test strategies, plans, schedules, and scripts. The goal of this role is to make sure that the team knows and addresses all issues before releasing the product.
- **User Education** - The job of this role is to enhance user performance so that users are as productive as possible with the product. To accomplish this goal, User Education acts as the advocate for the users of the product much like Product Management acts as the customer advocate. However, User Education also acts as the team's advocate to the users of the product. The goal of this role is enhanced user performance.
- **Logistics Management** - The job of this role is to serve as the advocate for operations, product support, help desk, and other organizations. This is normally a User Computer Services (UCS) role. This role creates rollout, installation, and support plans. The goal for this role is smooth deployment and ongoing management of the product.

On smaller teams, one team member will have more than one role. Two principles guide this type of role sharing:

- **Single role for Development** - Development team members should never be assigned to another role. The developers are the builders, and they should not be distracted from their main task. To give additional roles to the Development team only makes it more likely that schedules will slip due to these other responsibilities.
- **Conflict of interest** - Roles that have intrinsic conflicts of interest should not be combined. For example, Product Management and Program Management have conflicting interests.

Product Management wants to satisfy the customer whereas Program Management wants to deliver on time. If these roles are combined and the customer requests a change, the risk is that either the change will not get the consideration it deserves to maintain customer satisfaction, or that it will be accepted without understanding the impact on the project. Having different team members represent these roles helps to ensure that each perspective receives equal weight.

The following figure illustrates risky and acceptable combinations of roles. The role combinations marked N should not be combined because of conflicting interests. The role combinations marked U are unlikely combinations, as the skills required for each role differ. For example, the skills and focus of Product Management vary greatly from those of Logistics Management. The role combinations marked P are possible combinations, because they represent compatible interests. For example, Testing and User Education both focus on users and try to ensure that the users' needs are met.

	Product Management	Program Management	Development	Testing	User Education	Logistics Management
Product Management		N	N	P	P	U
Program Management	N		N	U	U	P
Development	N	N		N	N	N
Testing	P	U	N		P	P
User Education	P	U	N	P		U
Logistics Management	U	P	N	P	U	

Possible - Unlikely - No

As with any project team, successful role sharing comes down to the actual team members themselves and what experience and skills they bring to the project. Some projects successfully share roles even though the table indicates a risk. The point is that if a team needs to share roles, the goals of the roles must be kept in mind so that the amount of conflict that could arise because of the role sharing is controlled. Otherwise, some aspect of the key goals might be overlooked, or risks might be in some way mismanaged.

### Assumptions

Use of this team model assumes the following:

- There will be initial resistance to this model and the separation of duties.
- Initial projects following this model may experience delays due to learning curve.

## Benefits

- Clearly establishes roles and duties for web application projects.
- Acts as a “checklist” for necessary project tasks and goals.

## Consequences

- Teams will experience a learning curve in team dynamics.
- Additional resources must be identified and dedicated early in the project.

## Related Patterns

Pattern 4 - Use of the Unified Process for the Web Application Development Life Cycle

## Known Uses

Internet Services Project – Retirement Application (RailPoint)

## **Pattern 4**

### **Use of the Unified Process for the Web Application Development Life Cycle**

#### **Purpose**

The RRB has traditionally used a sequential or "Waterfall" model for application development. The Web development team will use the spiral model, which is an iterative approach to application development.

#### **Applicability**

This process should be used for all new web application projects.

#### **Structure Overview**

The Unified Process is a common model for application development that is based on the spiral model. The workflows of the Unified Process are five core processes that are that the project team will cycle through during the four phases of the development process until the application is completed. Each cycle of the five-workflow steps is called an iteration. A pre-release version of the application is produced at the end of each iteration. The five workflows are:

- Requirements - gathering business, application, and technical requirements.
- Analysis - business and application modeling based on requirements.
- Design - uses object-oriented design techniques to develop the application architecture.
- Implementation - execution of the design work (i.e., prototypes, beta, etc.)
- Testing - verifies the proper work has been done.

Because the Unified Process is based primarily on the Spiral Model, like that model, its four phases of development are Inception, Elaboration, Construction, and Transition. Each phase strives to achieve specific goals:

- Inception or Envisioning Phase - Produces a shared vision of the project. This phase produces a vision document, a master risk assessment document, and a project structure document. Culminates in the Vision Approved Milestone. Product Management is the primary driver of this milestone.

- Elaboration or Planning Phase - This phase is responsible for developing the baseline architecture. The Elaboration Phase's milestone is the Lifecycle Architecture Milestone. Culminates in the Project Plan Approved Milestone. Program Management is the primary driver of this milestone.
- Construction or Developing Phase - This phase has a focus on creating the product with incremental releases of product builds and features. The Construction Phase's milestone is the Initial Operation Capability Milestone. Culminates in the Scope Complete Milestone. Development and User Education are the primary drivers of this milestone.
- Transition or Stabilizing Phase - Iterations ensure the product is ready for release to the user community. The Transition Phase's milestone is the Product Release Milestone. Culminates in the Release Milestone. Testing and Logistics Management are the primary drivers of this milestone.

### **Assumptions**

Use of this pattern assumes the following:

- There will be initial resistance to this model as a departure from the standard RRB SDLC.
- Initial projects following this model may experience delays due to learning curve.

### **Benefits**

- Provides rapid development practices for web application projects.
- Includes the end user as a crucial part of the development process.

### **Consequences**

- Teams will experience a learning curve in team dynamics and the iterative process.
- Additional resources must be identified and dedicated early in the project.

### **Related Patterns**

Pattern 3 - Establish project teams for each Web Application

***Domain Participants***

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**Domain Team Leader:** Scott Palmer (Alternate: Annie Williams)

**Line of Business Representatives:** Catherine Leyser, Martha Barringer

**Domain Participants:** Denise Gammel, Frank Restivo, Robin Smith, Thomas Ertl, Robert Piech

**APG Representative:** Judy Lombardo

***Appendix 1: Domain Glossary***

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Term	Definition

**Appendix 2: Conceptual to Domain Principle Matrix**

Relationship Between RRB's Domain Principles And Conceptual Architecture Principles																									
Domain Principle	Conceptual Architecture Principles																								
	C A 1	C A 2	C A 3	C A 4	C A 5	C A 6	C A 7	C A 8	C A 9	C A 10	C A 11	C A 12	C A 13	C A 14	C A 15	C A 16	C A 17	C A 18	C A 19	C A 20	C A 21	C A 22	C A 23	C A 24	C A 25
D-1				X					X	X			X						X					X	
D-2				X																	X	X			
D-3				X	X	X						X						X	X						
D-4					X				X			X													
D-5					X	X	X		X					X				X							
D-6					X	X	X					X	X				X			X					
D-7							X	X																	
D-8																	X				X				X
D-9																					X			X	
D-10				X																	X				
D-11					X																		X		
D-12												X	X										X		

**Conceptual Architecture Guiding Principles:**  
 1. Use guidelines consistent with the Federal Enterprise Architecture. 2. Support a single Enterprise Wide Technical Architecture (EWTA). 3. IT projects are to be consistent with the Enterprise Architecture. 4. Business processes drive technical architectures. 5. Reduce integration complexity. 6. Technical architecture must be extensible and scalable. 7. Manage information and data as enterprise-wide assets. 8. Validate information as close to its source as possible. 9. Enhance the ability to capitalize on and exploit business information. 10. Support multiple data types. 11. Make an informed buy versus lease versus build decision before proceeding with any new development project. 12. Require shorter development cycle times. 13. Keep current with emerging technologies and their applicability to enterprise architecture. 14. Maximize infrastructure asset reuse. 15. Sustain reliable connectivity. 16. IT systems will be implemented in adherence with the agency's security, confidentiality and privacy policies. 17. The agency will use a consistent set of security interfaces and procedures. 18. Reduce total cost of operation (TCO). 19. Extend E-Mail to Become a Corporate Information Exchange Vehicle. 20. Adopt Open Systems Standards. 21. Reduce duplicate information systems. 22. Consider impact on business partners. 23. Maximize and exploit Internet and Intranet technologies and approaches. 24. Integrate Enterprise Architecture into the investment management process. 25. Customer perception is a measure of the quality of the automation processes.